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## ABSTRACT

Data used for this study were provided by classroom teachers concerning second grade students in an urban school system composed primarily of minority and economically disadvantaged children. Measures of children's internal and external feedback propensities were developed. The propensities' relationship to other variables of interest was investigated. Academic achievement and locus of control were selected as variables. The data obtained were factor analyzed using the principal-factor solution and varimax rotation. The study indicated students generated internal feedback and wanted external feedback from teachers and peers. Teachers' reports of student feedback propensities may have been influenced by their knowledge of the student's academic achievement. A self-report measure could eliminate this problem. The relationship between feedback scales and academic achievement is in need of further study. There might be a potential for creating learning and feedback experiences congruent with a student's feedback style. (DWH)

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Students' Propensities for Internally and Externally Mediated Performance Feedback and Their Relationship to Academic Achievement

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Abstract

Scales measuring individual differences in students' propensities for generating internal performance feedback and seeking external performance feedback from teachers and peers were factor analytically derived from data 15 classroom teachers provided on 176 second-grade students in an urban school system composed primarily of minority and economically disadvantaged children. In subsequent analyses the Internal Feedback measure was strongly related to two years' achievement test scores and moderately to an internal locus of control measure; of the external scales only Peer Feedback was related to achievement (N = 122). These individual differences measures may be useful in future investigations of feedback and achievement.

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STUDENTS' PROPENSITIES FOR INTERNALLY AND EXTERNALLY MEDIATED  
PERFORMANCE FEEDBACK AND THEIR RELATIONSHIP  
TO ACADEMIC ACHIEVEMENT

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Feedback, "information about performance," is generally accepted as an important component of learning and academic achievement. The concentration of research efforts on externally mediated feedback evident in the literatures on positive reinforcement, immediate versus delayed feedback, and knowledge of results, however, has not been accompanied by similar efforts to understand the effects of individual differences on the acceptance or usefulness of the feedback "administered." Nor have these literatures explored fully the notion of the performer as a legitimate source of feedback information.

Yet, individual differences do seem to operate in relation to feedback as well as performance (e.g., Baron and Ganz, 1972; Baron, Cowan, Ganz, and McDonald, 1974; Ilgen, Fisher, and Taylor, 1979). Baron and Ganz (1972) and Baron, Cowan, Ganz, and McDonald (1974), for example, found that students high in internal locus of control performed better on a cognitive task when opportunities for internal feedback were provided, students high in external locus of control performed better when external feedback was provided, and both groups performed about

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equally under these two conditions. Furthermore, Greller and Herold (1975) have reported "self" to be the most important of five sources of performance feedback available to working adults. Parsons, Herold, and Turlington (1981) subsequently reported that individual differences exist in the reliance on or preference for internally and externally mediated feedback for both college students and working adults, and that these differences are related to other personal characteristics, behaviors, and accuracy of self-assessments.

If these differences exist also in children and are identifiable, then scales measuring them could become a valuable tool in exploring ways to improve academic achievement. If some students are able to provide self-feedback, then they could continue to engage in the learning process even when external feedback is not readily available. Under this condition improved learning should result and be accompanied by improved performance as reflected in achievement test scores.

In addition, internally mediated feedback would be a tool the student could use on an ongoing basis and would meet several of the characteristics of effective feedback: timeliness ("immediate"), ready availability, and perceived "trustworthiness" of the source. If some students are unable to provide self-feedback, or require more external feedback, then the prescriptive indications are obvious. Therefore, the ability to identify the students' propensities in these terms would be important.

From these perspectives, the study was designed to develop useful measures of children's internal and external feedback propensities and to begin investigating their relationship to other variables of interest. In the first stage of the study, an instrument was designed to measure two of the constructs described by Parsons, Herold, and Turlington (1981): the ability to generate internal feedback and the propensity for external feedback.

With the assumption that such measures could be developed to differentiate among elementary school students, the second stage of the study was designed to explore the utility, and to some extent the validity, of the measures. Academic achievement was selected as a variable of particular interest because of its importance to the school system in which the study was conducted and to educators generally. With the reasoning that students who can provide self-feedback have acquired a skill that can contribute to improved learning and performance, it was expected that the ability to generate internal feedback would be positively related to performance on achievement tests.

Locus of control was selected as another variable of interest because it had frequently been reported to be related to academic achievement (e.g., Crandall, Katkovsky, & Crandall, 1965; Phares, 1976), and it seemed to be related conceptually to the propensity to generate internal feedback. That is, if both ability and effort are needed to generate internal feedback, then a student who tends to generate internal feedback would also tend to attribute the success or failure of academic outcomes to his or her own ability and efforts (internal locus of control).

### Scale Development

#### Method

Instrument. Based on previous work with adult populations (Parsons et al., 1981), eleven statements were written to reflect propensities for generating internal feedback and seeking external (teacher and peer) feedback regarding schoolwork. These statements were randomly inserted in a teacher checklist developed by White and Mouw (1976), which contained a twelfth statement conceptually congruent with the external feedback items and included in the subsequent analyses of the data. Teachers responded to the statements on a five-point verbally anchored agree-disagree scale.

Sample. Fifteen teachers responded to these twelve statements for 8-12 of their second-grade students who had been previously selected in a random sampling procedure for participation in a longitudinal study within a large Southeastern urban school system composed primarily of minority and economically disadvantaged students. Useful data were available for 176 students.

### Results

The data obtained were factor analyzed using the principal-factor solution and Varimax rotation of the Statistical Package for Social Sciences (SPSS) (Nie, Hull, Jenkins, Steinbrenner, & Bent, 1975). Using the criterion of an eigenvalue greater than one in conjunction with the scree test (Cattell, 1962), a three-factor solution was chosen for rotation and interpretation. Table 1 shows the results of the rotated factors, with the factor loadings for each statement and the eigenvalue of and percent of total variance in the data accounted for by each factor. As can be seen, the three factors closely approximated the requirements of a relatively simple factor structure (Thurstone, 1947); i.e., each item loaded heavily on one factor and had only low or moderate cross-loadings on other factors.

Although two factors — propensities for generating internal feedback and for seeking external feedback — had been anticipated, the six external feedback items separated into factors according to the source of external feedback. The conceptual homogeneity of the item sets loading on each factor led to the following interpretations:

Generating internal feedback (Internal Feedback). Five of the six items on this factor deal with the student's understanding of what needs to be done to complete a task and the student's ability to assess his or her performance. The sixth item, "seems to think highly of his or her own work," less clearly fits with the other five. (Six items.)

TABLE I  
RESULTS OF FACTOR ANALYSIS OF INTERNAL-EXTERNAL  
FEEDBACK ITEMS

| Factors and Items                                                                                                         | Factor Loadings |      |      |
|---------------------------------------------------------------------------------------------------------------------------|-----------------|------|------|
|                                                                                                                           | I               | II   | III  |
| <u>Factor I: Generating Internal Feedback</u>                                                                             |                 |      |      |
| This student seems to think highly of his or her own work.                                                                | .67             | .18  | .18  |
| This student seems to have a good sense of how s/he has done on a test or homework without your telling him.              | .75             | -.04 | -.03 |
| This student seems to have a well-developed sense of what is considered good work and what is not.                        | .83             | .12  | -.15 |
| This student usually has a clear picture of what s/he is supposed to do.                                                  | .78             | .05  | .09  |
| This student is a fairly good judge of his or her own performance.                                                        | .82             | .05  | .03  |
| When confronted with a task that is not clearly structured, this student tends to flounder.                               | -.49            | .21  | -.04 |
| <u>Factor II: Seeking External Feedback -- Teacher</u>                                                                    |                 |      |      |
| This student usually asks for your reaction to his or her work even when it is obviously correct.                         | -.10            | .66  | .27  |
| It is important to this student to seek your approval on his or her work.                                                 | .14             | .81  | .22  |
| This student often needs to know what grade s/he has made on a test or homework before you have had a chance to score it. | .07             | .50  | .38  |
| <u>Factor III: Seeking External Feedback -- Peers</u>                                                                     |                 |      |      |
| This student seems to receive much guidance or feedback on his or her work from other students.                           | -.02            | .28  | .42  |
| This student seems to show a strong interest in how other students did on a test or homework assignment.                  | .05             | .25  | .68  |
| This student often compares his or her work to that of other students.                                                    | .05             | .15  | .77  |
| Eigenvalue                                                                                                                | 3.79            | 2.89 | 1.05 |
| Percent of Variance Explained                                                                                             | 31.6            | 24.1 | 8.7  |

Seeking external feedback — teacher (Teacher Feedback). The student is unsure of the adequacy of his or her performance and must obtain the inputs of the teacher. (Three items.)

Seeking external feedback -- peers (Peer Feedback). The student obtains help from other students directly (guidance or feedback) and indirectly (standards of comparison) to determine how well he or she has performed. (Three items.)

Cronbach's alpha coefficients for the three defined scales created by unit-weighting items that loaded heavily on the factors were .85, .75, and .70 for Internal Feedback, Teacher Feedback, and Peer Feedback, respectively. Not surprisingly, the two external scales were positively related ( $r = .50$ ), and neither was related to Internal Feedback (with Teacher Feedback,  $r = .09$ ; with Peer Feedback,  $r = .07$ ). However, with only 25% common variance between the two external scales and their potential utility for educational research, their continued use seemed justified.

#### Relationship of Scales to Other Variables

In the second stage of the study, relations among the newly developed measures, scores on reading and mathematics achievement tests for two years, and an internal locus of control measure, were examined.

#### Method

Procedure. Achievement tests were administered as part of the systemwide testing program. Total reading and total mathematics scores were obtained from the administration of the Iowa Tests of Basic Skills (Form C, Houghton-Mifflin, 1971) during the same academic quarter in which the teachers were asked to complete the feedback questionnaire and from the administration of the California Achievement Tests (Form C, CTB/McGraw-Hill, 1978) a year later.

Research assistants administered during the same quarter the Modified Intellectual Achievement Responsibility questionnaire (Ringelheim, Bialer, & Morrissey, 1970), a 24-item, forced-choice locus of control measure to indicate to what extent subjects believe their academic successes and failures are internally or externally controlled. (Sample item: "When you pass a test, is it (a) because you studied, or (b) because it was easy?"

Sample. Complete data on the feedback, achievement, and locus of control measures were available for 122 of the 176 second-grade students in the sample used to develop the feedback scales. The reduced sample was due primarily to normal attrition of students in the school system from one year to the next.

### Results

Table 2 shows the Pearson correlation coefficients obtained.

TABLE 2  
PEARSON COEFFICIENTS OF CORRELATION AMONG FEEDBACK  
PROPENSITIES, ACHIEVEMENT TEST SCORES,  
AND INTERNAL LOCUS OF CONTROL  
(ONE-TAILED TESTS, N = 122)

|                           | Achievement Test Scores |                    |                     |                    | Internal<br>Locus of<br>Control |
|---------------------------|-------------------------|--------------------|---------------------|--------------------|---------------------------------|
|                           | Time 1 <sup>a</sup>     |                    | Time 2 <sup>b</sup> |                    |                                 |
|                           | <u>Reading</u>          | <u>Mathematics</u> | <u>Reading</u>      | <u>Mathematics</u> |                                 |
|                           |                         |                    |                     |                    |                                 |
| Feedback Propensities     |                         |                    |                     |                    |                                 |
| Internal                  | .37***                  | .43***             | .49***              | .57***             | .26**                           |
| External-Teacher          | .09                     | .14                | .05                 | .01                | .03                             |
| External-Peer             | .12                     | .17*               | .03                 | .00                | .06                             |
| Internal Locus of Control | .34***                  | .17*               | .40***              | .38***             |                                 |

\* $p \leq .05$   
 \*\* $p \leq .01$   
 \*\*\* $p \leq .001$

<sup>a</sup>Iowa Tests of Basic Skills, grade equivalent scores.

<sup>b</sup>California Achievement Tests, scale scores.

Statistically significant correlations were found between the Internal Feedback scale and scores on achievement tests taken during the academic quarter in which the other data were collected and one year later. The only other statistically significant correlation found between the feedback scales and the achievement test scores was that of Peer Feedback with mathematics achievement at time 1.

A statistically significant positive correlation was also found between internal locus of control and Internal Feedback, while no statistically significant correlations (positive or negative) were obtained between internal locus of control and the external feedback variables.

Internal locus of control was also positively and significantly correlated with the reading and mathematics achievement test scores at both times, but consistently less strongly than Internal Feedback with achievement. In two-tailed tests of the significance of the difference between (dependent) correlation coefficients, Internal Feedback did correlate with mathematics achievement test scores to a significantly greater degree than internal locus of control at the 5%  $\alpha$  level (at time 1,  $t = 2.596$ ,  $df = 119$ ; at time 2,  $t = 2.196$ ,  $df = 119$ ). Internal Feedback did not correlate with reading achievement test scores to a significantly greater degree than locus of control at either time. Because of the higher correlations between Internal Feedback and the test scores, Internal Feedback understandably accounted for more variance (14% to 33%) in achievement test scores than internal locus of control (1% to 8%) in four different multiple regression analyses ( $N = 122$ ), each with a different achievement test as the dependent variable (i.e., reading and mathematics each at time 1 and time 2).

The correlation coefficients of both the Internal Feedback and the internal locus of control measures with reading and mathematics achievement test scores were uniformly higher at time 2 than at time 1.

### Discussion and Conclusions

The results of the study indicate that students do seem to generate internal feedback and seek external feedback from teachers and peers, that these propensities can be observed and reported by teachers, and that teachers perceive students as differing on these dimensions.

Internal Feedback was related as expected to performance on achievement tests and to internal locus of control, supporting to some extent the construct validity of the Internal Feedback scale. The correlation between Peer Feedback and the mathematics achievement test at time 1, on the other hand, was not expected. Current research, however, is beginning to investigate the relationships between Peer Feedback as reported both by teachers and students to performance on achievement tests.

The stronger correlations of Internal Feedback and internal locus of control with achievement test scores at time 2 may be due to maturation. The students may have become more internally oriented (both in feedback propensity and locus of control) in either of the two years for which achievement test scores were examined. Because two different achievement tests were used in the study, current studies are investigating the predictive validity of the Internal Feedback scale over time when the same achievement test is used.

It is noteworthy that externally and internally mediated feedback propensities were not simply opposite ends of a single continuum but rather seem to be independent constructs as found with samples of college students and adults in work settings (Parsons et al., 1981). In the future this knowledge may be useful in investigating the combinations of feedback modalities which any given student may be using as researchers attempt to understand better the role of feedback in learning.

Methodologically the greatest problem with the current results is the fact that teacher reports of student feedback propensities may be influenced by or confounded with the teacher's knowledge of the student's academic achievement. Future research would need to look more closely at the validity of the feedback measures as reported by teachers. Current work is looking at self-report measures of feedback propensities.

The relationships between the feedback scales and academic achievement seem worthy of further research attention. If the validity of the feedback measure is supported, then one could attempt to identify what it is that some students do differently which allows them to develop this "internal yardstick." Furthermore, one could investigate the potential for creating learning and feedback experiences which are more congruent with a student's feedback "style."

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